UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

OFFICE OF ENVIRONMENTAL CLEANUP
EMERGENCY MANAGEMENT PROGRAM

Site Specific Sampling Plan

Project Name: John Day Vapor Response Site ID: 10PB

Author: Eric Nuchims Company: Ecology & Environment, Inc. Date Completed: 7/6/15

This Site Specific Sampling Plan (SSSP) is prepared and used in conjunction with the Quality Assurance Plan (QAP) for the Emergency Management Program for collecting samples during this Removal Program project. The information contained herein is based on the information available at the time of preparation. As better information becomes available, this SSSP will be adjusted.

When inadequate time is available for preparing the SSSP in advance of the sampling event, a Field Sampling Form may be prepared on-site immediately prior to sampling. This full length version of the SSSP is written after the sampling event and the completed Field Sampling Form attached to it.

1. Approvals

Name, Title	Telephone, Email, Address	Signature
Michael Boykin **On-Scene Coordinator**	206-553-6362 boykin.michael@epa.gov USEPA , M/S: ECL-133, 1200 Sixth Ave. Suite 900, Seattle, WA 98101	
Kathy Parker **EMP Quality Assurance Coordinator**	206-553-0062, parker.kathy@epa.gov USEPA , M/S: ECL-116, 1200 Sixth Ave. Suite 900, Seattle, WA 98101	

I. Project Management and Organization

2. Personnel and Roles involved in the project:

Name	Telephone, Email, Company, Address	Project Role	Data Recipient
Michael Boykin	206-553-6362 boykin.michael@epa.gov USEPA , M/S: ECL-133, 1200 Sixth Ave. Suite 900, Seattle, WA 98101	On Scene Coordinator	Yes
Eric Nuchims	206-624-9537 enuchims@ene.com Ecology and Environment, Inc. 720 3rd Ave Suite 1700, Seattle, WA 98104	Author of SSSP, START Project Manager	Yes
Kathy Parker	206 553-0062, parker.kathy@epa.gov USEPA , M/S: ECL-116, 1200 Sixth Ave. Suite 900, Seattle, WA 98101	EMP Quality Assurance Coordinator	No
Mark Woodke	206-624-9537, mwoodke@ene.com, E & E 720 Third Ave, Suite 1700 Seattle, WA 98104	START Quality Assurance Reviewer	Yes
Eric Young	206-285-8282, eyoung@friedmanandbruya.com, Friedman and Bruya 3012 16th Ave W, Seattle, WA 98119	Laboratory contact	No
Kris Allen	206-248-4970, Kristine.allen@testamericainc.com, 5755 8th Street East, Tacoma, WA 98424	Laboratory contact	No
Carlene McCutcheon	602-659-7612, carlene.mccutcheon@testamerica.com, 4625 East Cotton Ctr Blvd, Phoenix, AZ 85040	Laboratory contact	No

Name	Telephone, Email, Company, Address	Project Role	Data Recipient
Kurt Johnson	360-556-6513, kjohnson@cascadiaforensics.com, 3839 Sunset Beach Drive Northwest, Olympia, WA 98502	Analytical chemist contact	No
Larry Duty	832-364-0173, lduty@e-labdc.com, E-lab Consultants	Analytical chemist contact	No

3. Physical Description and Site Contact Information:

Site Name	John Day Vapor Response	
Site Location	The site is located in the City of John Day (Figure 1)	
Property Size	Multiple Properties involved approximately 43.8 acres and 70 properties.	
Site Contact	Multiple	**Phone Number:** N/A
Nearest Residents	Within the area of concern	**Direction: N/A**
Primary Land Uses Surrounding the Site	Residential, Commercial, and Industrial	

4. The proposed schedule of project work follows:

Activity	Estimated Start Date	Estimated Completion Date	Comments
SSSP Review/Approval	5/21/15	7/6/15	
Mobilize to / Demobilize from Site	5/21/2015	6/11/15	
Sample Collection	5/21-25/2015	6/11/15	
Laboratory Sample Receipt	5/27/2015	6/15/15	
Laboratory Analysis	5/28/2015	TBD	For additional Fingerprint analysis
Data Validation	6/15/15	TBD	For additional Fingerprint analysis

5. Historical and Background Information

The site consists of an approximately ½ mile long and 2 city block-wide area of residences, a church, and some light commercial businesses, located on the south side of the City of John Day, Oregon. The site runs parallel to, and along South Canyon Boulevard (U.S. Highway 395) and Canyon Creek. Canyon Creek is reported to be a migratory pathway for salmon and steelhead trout. Further, Canyon Creek flows into the John Day River approximately ¾ mile downstream of John Day. The John Day River is a significant river in eastern Oregon noted for its steelhead and salmon runs, smallmouth bass fishery, and recreations activities. It is also used as an irrigation source by farms and ranches along its length.

In mid-May 2015, the Oregon Department of Environmental Quality (ODEQ) requested assistance from the United States Environmental Protection Agency (EPA) in response to numerous reports of unusual odors in and around homes and commercial buildings along South Canyon Boulevard. The problem was initially reported in February and early-March 2015 at the United States Department of Agriculture (USDA) and State Soil Conservation Service (SSCS) building, where employees noted strong odors and health effects such as headaches, irritated eyes, and sore throats. The SSCS then contracted a consultant to investigate the odors and their potential source inside the building. The investigation revealed high levels of volatile organic compounds (VOCs) in the building and crawl space. Similar complaints from residents in the vicinity of the USDA/SSCS building began being received by the City of John Day in early May 2015. The City of John Day began their own investigation and collected indoor air samples from one home and the public library. Elevated levels of VOCs were detected in both of these samples. The City of John Day contacted ODEQ for assistance. ODEQ then requested assistance from EPA.

EPA and the START contractor mobilized to the site on May 21, 2015 and met with the John Day City Manager, the Chief of Police, The Fire Chief, and the Public Works Manager and toured the impacted areas of John Day. START then began conducting air monitoring in homes and businesses from

which reports of odors had come (Figure 2). After consultation with an EPA Toxicologist, an initial/interim screening level of 5,000 parts per billion (ppb) was established. In home or businesses where concentrations of vapors exceeded the initial screening criteria, owners/operators were given instructions on conducting mitigation measures to reduce vapors. Follow-up screening was conducted to determine the effectiveness of the mitigation measures and in some homes, air samples were collected (Figure 3). In addition to indoor air monitoring START conducted monitoring at manhole covers along the sewer system in the city (Figure 2). In attempt to determine the source of contamination, subsurface soil and groundwater samples were collected from boreholes installed using direct-push technology. (Figure 4).

6. Conceptual Site Model

Contaminants: Volatile Organic Compounds (VOC's), including hexane, benzene, ethylbenzene, xylenes, 2-methylbutane, pentane, butane, hexane, cyclohexane, 3- and 2-methylhexane, heptane, isobutene, and methylcyclohexane,. The initial conceptual site model indicates a release of petroleum release from a nearby facility; however, additional potential sources of contamination have not been eliminated.

Transport Mechanisms: Vapors entering basements and crawl spaces through soil and/or groundwater.

Receptors: Residents and/or workers in impacted buildings. Potential ingestion of contaminated groundwater.

7. Decision Statement

The decision(s) to be made from this investigation is/are to:

- Determine if vapor concentrations inside structures are above action levels and harmful to human health.
- Determine if soil concentrations are above action levels.
- Determine if contamination is present in groundwater including drinking water sources and harmful to human health.
- Determine potential sources of contamination.

8. Action Level

Based on conversations with an EPA Toxicologist, an initial/interim value of 5,000 ppb of total VOCs was used for screening the interior of structures, outdoor air, sewer manhole access points, borehole locations, and Geoprobe sleeves.

The following air screening criteria will be considered in the evaluation of the air analytical data and are compile from the Regional Screening Levels (RSLs) for urban residential inhalation and occupational inhalation and the Oregon Risk-Based Concentrations (RBCs) for urban residential inhalation and occupational inhalation.

Analyte Name	CAS Number	EPA Regional Screening Levels		Oregon Risk-Based Concentrations		
		Residential	Industrial	Cleanup Level	Air Inhalation Urban Residential	Air Inhalation Occupational
Benzene	71-43-2	0.36	1.6	0.31	0.85	1.6
Cyclohexane	110-82-7	630	2600	N/A	N/A	N/A
Ethylbenzene	100-41-4	1.1	4.9	0.97	2.7	4.9
Xylenes	1330-20-7	10	44	100	100	440

Note: All air units are in micrograms per cubic meter (ug/m^3).

The following soil screening criteria will be considered in the evaluation of the soil analytical data and are compiled from EPA Removal Management Levels (RMLs) for both residential and industrial soils, the RSLs for both residential and industrial soils, and the RBCs for residential soil dermal contact and inhalation, occupational soil dermal contact in inhalation, occupational soil volatilization to outdoor air, residential soil volatilization to outdoor air, occupational soil vapor intrusion into buildings, residential soil vapor intrusion into buildings, occupational soil leaching to groundwater, and residential soil leaching to groundwater.

Analyte Name	CAS Number	EPA Removal Management Level		EPA Regional Screening Levels	
		Residential	Industrial	Residential	Industrial
Benzene	71-43-2	82	420	1.2	5.1
Cyclohexane	110-82-7	6500	27000	650	2700
Ethylbenzene	100-41-4	580	2500	5.8	25
Xylenes	1330-20-7	580	2500	58	250

Note: All soil units are in milligrams per kilogram (mg/kg).

Analyte Name	CAS Number	Oregon Risk-Based Concentrations							
		Soil Dermal Contact and Inhalation Residential	Soil Dermal Contact and Inhalation Occupational	Soil Volitilization to Outdoor Air Occupational	Soil Volitilization to Outdoor Air Residential	Soil Vapor Intrusion into Buildings Occupational	Soil Vapor Intrusion into Buildings Residential	Soil Leaching to Ground Water Occupational	Soil Leaching to Ground Water Residential
Benzene	71-43-2	7.3	34	50	10	1.2	0.08	0.053	0.0093
Ethylbenzene	100-41-4	30	140	160	31	12	0.82	0.9	0.16
Xylenes	1330-20-7	1400	25000	N/A	N/A	N/A	100	100	25

Note: All soil units are in milligrams per kilogram (mg/kg).

The following groundwater screening criteria will be considered in the evaluation of the groundwater analytical data and are compiled from RMLs maximum contaminant levels (MCLs), the RSLs MCLs, and RBCs occupational groundwater volatilization to outdoor air, residential volatilization to outdoor air, occupational groundwater vapor intrusion into buildings, and residential groundwater vapor intrusion into buildings.

Analyte Name	CAS Number	EPA Removal Management Level	EPA Regional Screening Levels		
			MCL	Tapwater	Primary MCL
Benzene	71-43-2	33	5	0.45	5
Cyclohexane	110-82-7	13000	N/A	1300	N/A
Ethylbenzene	100-41-4	150	700	1.5	700
Xylenes	1330-20-7	190	10000	19	10000

Note: All water units are in micrograms per liter (ug/L).

Analyte Name	CAS Number	Oregon Risk-Based Concentrations			
		Groundwater Volatilization to Outdoor Air Occupational	Groundwater Volatilization to Outdoor Air Residential	Groundwater Vapor Intrusion into Building Occupational	Groundwater Vapor Intrusion into Building Residential
Benzene	71-43-2	14000	2800	2800	190

Ethylbenzene	100-41-4	41000	8200	7400	490
Xylenes	1330-20-7	N/A	N/A	N/A	58000

Note: All water units are in micrograms per liter (ug/L).

II. Data Acquisition and Measurement Objectives

9. Site Diagram and Sampling Areas

The sampling areas for the site consist of the following (Figures 2 through 4):

1. The City of John Day sewer system;
2. Residential and commercial structures and associated wells between SW Brent Drive to the west, South Canyon Blvd to the east, SW 2nd Ave to the north and just south of SW 6th Ave to the south.
3. Boreholes between SW Brent Drive to the west, South Canyon Blvd to the east, SW 2nd Ave to the north and just south of SW 6th Ave to the south.
4. Potentially responsible party structures, and
5. Irrigation wells between SW Brent Drive to the west, South Canyon Blvd to the east, SW 2nd Ave to the north and just south of SW 6th Ave to the south.

10. The Decision Rules

The following statement(s) describe the decision rules to apply to this investigation:
If air monitoring results indicate the presence of VOC concentrations above 5,000 ppb, the occupant will be provided with information for conducting mitigation measures. A follow-up visit will be conducted to determine the effectiveness of the mitigation measures and to determine if these measures should continue. Air samples will be collected from a subset of the structures.
If air monitoring results indicated that VOCs are above 5,000 ppb in the borehole or in the groundwater headspace, additional sampling of borehole soils may occur.
If groundwater is reached in borehole, a water sample will be collected.

11. Information Needed for the Decision Rule

The following inputs to the decision are necessary to interpret the analytical results:

- Action levels
- Concentrations of soil and air from monitoring activities
- Past and current use of buildings and suspected sources within the area of concern
- Construction of the structure (presence of a crawl space and/or basement)
- Lithology and hydrogeology of area
- Atmospheric data (temperature, humidity, air pressure, etc.)
- Contaminant concentration in soils, groundwater, and air

12. Sampling and Analysis

The following sampling and analysis is planned for each sampling area:

Area 1:

1. The sampling pattern is targeted based on the presence of manhole access points along the sewer system.
2. The number of locations will be determined based on the presence of manhole access points along the sewer system.
3. Grab samples will be collected at the manhole access points along the sewer system.
4. Air samples will be collected at the manhole access points.
5. Samples will be analyzed for VOCs and/or SVOCs.
6. Samples will be analyzed in the on-site field laboratory and/or an off-site fixed laboratory.

Area 2:

1. The sampling pattern will be targeted by conducting house-to-house interviews to determine if a basement and/or crawl space is present at the structure. Following the assessment of the presence of a basement/crawl space, structures where monitoring indicated the presence of vapors air samples will be collected.
2. Structures will be surveyed to determine the presence/absence of VOCs in the air in crawl spaces/basements. Repeated sampling will be conducted in locations where readings continue to be above action levels.
3. Grab samples will be collected in the structures.

4. Air samples will be collected in basements and/or crawl spaces within the structures.
5. Samples will be analyzed for VOCs and/or SVOCs.
6. Samples will be analyzed in the on-site field laboratory and/or an off-site fixed laboratory.

Area 3:

1. The sampling pattern will be random within each borehole based on recovery from each borehole interval.
2. The number of locations will be determined based on visual observations at each borehole and at the discretion of the OSC.
3. Composite samples will be collected from each borehole interval (4 foot cores) as recovery permits.
4. Soil samples will be collected from the borehole cores as recovery permits. Groundwater samples will be collected if encountered.
5. Samples will be analyzed for VOCs, SVOCs, TPH-Dx, TPH-Gx, and/or oil fingerprinting.
6. Samples will be analyzed at an off-site fixed laboratory.

Area 4:

1. The sampling pattern will be targeted at each potentially responsible party location.
2. The number of samples will be determined based on the number of products offered at the facility.
3. Grab samples will be collected.
4. Product samples will be collected at each facility.
5. Samples will be analyzed for VOCs, TPH-Dx, TPH-Gx, and/or oil fingerprinting.
6. Samples will be analyzed at an off-site fixed laboratory.

Area 5:

1. The sampling pattern will be targeted to irrigation wells as defined by the site.
2. Four irrigation wells will be sampled.
3. Grab samples will be collected from the irrigation wells.
4. Groundwater samples will be collected from the irrigation wells.
5. Samples will be analyzed for VOCs, TPH-Dx, TPH-Gx, and/or oil fingerprinting.
6. Samples will be analyzed at an off-site fixed laboratory.

13. Applicability of Data (place an X in front of the data categories needed, explain with comments)

*_X__**A) Definitive data** is analytical data of sufficient quality for final decision-making. To produce definitive data on-site or off-site, the field or lab analysis will have passed full Quality Control (QC) requirements (continuing calibration checks, Method Detection Limit (MDL) study, field duplicate samples, field blank, matrix spikes, lab duplicate samples, and other method-specific QC such as surrogates) AND the analyst will have passed a Precision and Recovery (PAR) study AND the instrument will have a valid Performance Evaluation sample on file. This category of data is suitable for: **1) enforcement purposes, 2) determination of extent of contamination, 3) disposal, 4) RP verification or 5) cleanup confirmation.***
Comments:

*_X__**B) Screening data with definitive confirmation** is analytical data that may be used **to support preliminary or intermediate decision-making** until confirmed by definitive data. However, even after confirmation, this data is often not as precise as definitive data. To produce this category of data, the analyst will have passed a PAR study to determine analytical error AND 10% of the samples are split and analyzed by a method that produced definitive data with a minimum of three samples above the action level and three samples below it.*
Comments:

*_X__**C) Screening data** is analytical data which has not been confirmed by definitive data. The QC requirements are limited to an MDL study and continuing calibration checks. This data can be used for making decisions: **1) in emergencies, 2) for health and safety screening, 3) to supplement other analytical data, 4) to determine where to collect samples, 5) for waste profiling, and 6) for preliminary identification of pollutants**. This data is not of sufficient quality for final decision-making.*
Comments:

14. Special Sampling or Analysis Directions

- Air monitoring and field analysis via GC/MS will determine need/locations for air sampling and locations.
- Observed sheen and/or air monitoring results in boreholes, soil, or sewer mains may trigger

forensic oil fingerprint analysis

- Samples sent for oil fingerprinting forensic analysis will either be preserved or frozen to allow for future analysis. Specific methodology are outlined in Table 2 below.
    - Each petroleum oil has distinctive molecular characteristics that distinguish is from other oils. Known as a “fingerprint”, these characteristics are used by a chemist to determine if a chemical relationship is present between oil samples.

15. Method Requirements

- Methods must achieve lower quantitation limits of less than the action levels.
- Methods must be performed exactly as written without modification by the analytical laboratory.

16. Sample Collection Information

The applicable sample collection Standard Operating Procedures (SOPs) or methods will be followed and include:

- Field Activity Logbooks;
- Borehole Installation and Subsurface Soil Sampling Methods;
- Geoprobe Operations;
- Groundwater Sampling Devices;
- Groundwater Well Sampling;
- Measuring Water Level and Well Depth;
- VOC – Soil and Sediment Sampling;
- Sampling Equipment Decontamination;
- Environmental Sample Handling, Packaging and Shipping;
- Geologic Logging;
- SOP301A – General Laboratory Practices;
- SOP209A Vapor Intrusion;
- SOP501A Hapsite Practices;
- GPS Data Processing Guide;
- MultiRAE Pro Quick-start Guide and Data Processing Guide; and
- AreaRAE Quick-start Guide and Data Processing Guide.

17. Optimization of Sampling Plan (Maximizing Data Quality While Minimizing Time and Cost)

Air monitoring and field analysis via GC/MS will determine sample locations and provide a means to triage locations and other analyses, as outlined in Section 12 above.

The format for sample number identification is summarized in Table 1. Sample collection and analysis information is summarized in Table 2.

Table 1
SAMPLE CODING

Project Name: ____John Day Vapor Response_____ **Site ID: 10PB__**

SAMPLE NUMBER [(1)]		
Digits	**Description**	**Code (Example)**
1,2,3,4	Year and Month Code	1505
5,6,7,8	Consecutive Sample Number (grouped by SA as appropriate)	3001 – 4000

SAMPLE NAME / LOCATION ID [(2)] ***(Optional)***		
1,2	Sampling Area	BG – Background CS – Crawlspace OR – Occupied Residence UR – Unoccupied Residence MW – Monitoring Well RS – Rinsate BS – Business TB – Trip Blank EX - Excavation BH – Borehole MH – Manhole IR – Irrigation Well TP – Test Pit
3,4	Consecutive Sample Number	01 – First sample of Sampling Area
5,6	Matrix Code	AR – Air GW – Groundwater PR – Product SB – Subsurface Soil SD – Sediment SS – Surface Soil SW – Surface Water QC – Quality Control WT – Water WW – Waste Water
7,8	Depth (Optional) Air Sample Media	01 (feet below ground surface) ST – Sorbent Tube SU – Suma Canister

Notes:
(1) The Sample Number is a unique, 8-digit number assigned to each sample.
(2) The Sample Name or Location ID is an optional identifier that can be used to further describe each sample or sample location.

Table 2. Sampling and Analysis

Matrix	Data Type	Sampling Areas	Sampling Pattern	Sample Type	Data Quality	Number of Field Samples	Analyte or Parameter	Method Number	Action Level	Method Quantitation Limit	Number/type sample containers	Preservative	Holding Time	Field QC
Air	Field Screening	1, 2	Targeted	Grab	Screening		VOCs	SOP501A	5,000 ppb	Variable	Direct read into the instrument	NA	NA	NA
	Laboratory Data				Definitive	22	VOCs	NIOSH 1501 or EPA TO-15	See Section 8		1 sorbent tube or canister	NA	NA	Equipment blank
						4	PAHs	NIOSH 5506			1 sorbent tube	NA	NA	NA
Product		4				5	Oil Fingerprinting	Hydrocarbon Fuel Scan			2 x40mL Amber glass with Teflon-lined lid	N A	NA	NA
						2	GRO	NWTPH-Gx				NA	NA	NA
Soil		3				4	Oil Fingerprinting	Hydrocarbon Fuel Scan			3xCore-N-One	NA	NA	NA
						12	GRO	NWTPH-Gx			3xCore-N-One + 2-ounce glass jar	NA	At lab or frozen with 48 hours; 14 days from collection	1 Trip blank per cooler shipped
						12	VOCs	EPA 8260B			3xCore-N-One + 2-ounce glass jar	NA	At lab or frozen with 48 hours; 14 days from collection	1 Trip blank per cooler shipped
Water		3, 5				29	Oil Fingerprinting	Hydrocarbon Fuel Scan			2 – 1 Liter Amber glass and 3x40mL Amber glass with Teflon-lined lid	NA	NA	NA
						47	VOCs	EPA 8260B			3x40mL Amber glass with Teflon-lined lid	pH ≤ 2 with HCl	14 Days	1 Trip blank per cooler shipped
						47	GRO	NWTPH-Gx			3x40mL Amber glass with Teflon-lined lid	pH ≤ 2 with HCl	14 Days	1 Trip blank per cooler shipped
						46	DRO	NWTPH-Dx			2 – 1 Liter Amber glass	NA	14 days to extraction 40 days to analysis	NA
						14	SVOCs	EPA 8270			2 – 1 Liter Amber glass	NA	7 days to extraction 40 days to analysis	NA

Note: For matrix spike and/or duplicate samples, no extra volume is required for air (unless co-located samples are collected), oil, product, or soil samples except soil VOC or NWTPH-Gx samples (triple volume). Triple volume is also required for organic water samples (double volume for inorganic).

III. Assessment and Response

A Sample Plan Alteration Form (SPAF) will be used to describe project discrepancies (if any) that occur between planned project activities listed in the final SSSP and actual project work. The completed SPAF will be approved by the OSC and QAC and appended to the original SSSP.

A Field Sampling Form (FSF) may be used to capture the sampling and analysis scheme for emergency responses in the field and then the FSF pages can be inserted into the appropriate areas of the final SSSP.

Corrective actions will be assessed by the sampling team and others involved in the sampling and a corrective action report describing the problem, solution, and recommendations will be forwarded to the OSC and the EMP QAC.

IV. Data Validation and Usability

The sample collection data will be entered into Scribe and Scribe will be used to print lab Chains of Custody. Results of field and lab analyses will be entered into Scribe as they are received and uploaded to Scibe.net when the sampling and analysis has been completed.

18. Data Validation or Verification will be performed by:

	Data Verification and Validation Stages						
Performed by:	I	IIA	IIB	III	IV	Verification	Other:
E and E QA Reviewer			100% Fixed Lab		10% Fixed Lab	Hapsite Data/Monitoring Data	
EPA Region 10 QA Office							
MEL staff							
Other:							

The following qualifiers shall be used in data validation:

- U = The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
- J = The associated numerical value is an estimated quantity because the reported concentrations were less than the sample quantitation limits or because quality control criteria limits were not met.
- UJ = The material was analyzed for but was not detected. The reported detection limit is estimated because QC criteria were not met.
- R = The sample results are rejected (analyte may or may not be present) due to gross deficiencies in quality control criteria. Any reported value is unusable. Resampling and/or reanalysis is necessary for verification.
- H = The sample result is biased high.
- K = The bias of the sample is not known.
- L = The sample result is biased low.
- Q = Detected concentration is below the method reporting limit/Contract Required Quantitation Limit, but is above the method quantitation limit.